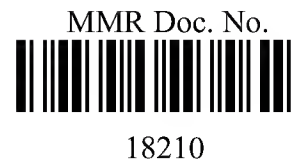




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28 February 2006



Mr. Jonathan S. Davis  
Remediation Program Manager  
HQ AFCEE/MMR  
322 E. Inner Road  
Otis ANG Base, MA 02542-5028

SUBJECT: AFCEE 4P F41624-03-D-8595; Task Order 0251  
MMR SPEIM/LTM/O&M Program  
CDRL #A001E  
**Fuel Spill-1 2005 Summary Letter Report**

Dear Mr. Davis:

This letter report includes a summary of the activities performed and the data collected for the Fuel Spill-1 (FS-1) System Performance and Ecological Impact Monitoring (SPEIM) program between 01 September 2004 and 31 December 2005. The prior SPEIM submittal for the FS-1 plume was the *Final Fuel Spill-1 2004 System Performance and Ecological Impact Monitoring Report* dated June 2005 that included data collected through August 2004 (AFCEE 2005)<sup>1</sup>.

The contaminant of concern (COC) for the FS-1 plume is ethylene dibromide (EDB), and lead and thallium are groundwater COCs for the FS-1 source area. The interim FS-1 extraction, treatment, and discharge (ETD) system operated between 05 April 1999 and 13 October 2002, when a fire consumed the treatment plant. The interim ETD system was designed to extract 750 gallons per minute (gpm) from the aquifer using one extraction well and 175 shallow wellpoints located in the southern portion of the plume. The final FS-1 ETD system began operating on 30 September 2003, and was designed to extract 750 gpm from the aquifer using four extraction wells located in the south south-central portion of the plume. The water is treated by a granular activated carbon system and discharged to the K1 and K2 bog ditches via three vertical riser pipes (i.e., bubblers). The FS-1 plume and treatment system are presented in [Figure 1](#).

The Air Force Center for Environmental Excellence (AFCEE) installed the FS-1 extraction, treatment, and discharge (ETD) system under a Final Record of Decision (AFCEE 2000)<sup>3</sup>, with the selected alternative modified as described in the final wellfield design report (AFCEE 2001)<sup>2</sup>.

## FS-1 SPEIM ACTIVITIES

The SPEIM program was developed to monitor plume changes and to ensure the effective operation of the AFCEE groundwater remediation systems at Massachusetts Military Reservation (MMR). These objectives are met through monitoring of selected media (i.e., groundwater, surface water) within and outside the plume boundaries, treatment plant monitoring, and groundwater flow and transport modeling. Activities completed for the FS-1

SPEIM program during this reporting period (September 2004 through December 2005) include the following:

**Standard SPEIM Sampling Activities:**

- Monthly (September 2004 through May 2005), quarterly (July and November 2005), semiannual (November 2004 and November 2005), and annual (May 2005) groundwater sampling
- Semiannual (May and November 2005) synoptic water level measurements
- Monthly (September 2004 through December 2004 and February through December 2005), quarterly (October and December 2004, and March, June, August, and December 2005), and semiannual (June and December 2005) surface water sampling
- Monthly treatment plant sampling (September 2004 through December 2005)
- Recording of daily average treatment system flow rates (September 2004 through December 2005)

The groundwater and surface water locations sampled for the FS-1 SPEIM program between September 2004 and December 2005 are presented in [Figure 2](#). Groundwater and surface water monitoring locations utilized for hydraulic monitoring between September 2004 and December 2005 are depicted in [Figure 3](#). The well construction and surface water sample location information is included in [Table 1](#). The current approved FS-1 SPEIM network, including analytical scope and methods, is presented in the *Comprehensive Long Term Monitoring Plan*, which is available on-line at [www.mmr.org](http://www.mmr.org) under Plans and Protocols.

Groundwater analytical results are presented in [Table 2](#) and surface water analytical results are presented in [Table 3](#). These summary tables include results for the COCs and field parameters. A map showing the distribution of EDB in groundwater is included as [Figure 4](#). Hydraulic monitoring results are included in [Table 4](#). A comparison of all compounds detected in groundwater, surface water, and treatment plant samples to applicable standards is included in [Attachment A](#).

**Additional Sampling Activities:**

- Monthly (September 2004 – March 2005) and weekly (April – December 2005) water level measurements in support of a hydrologic assessment of two ecosystems of concern

**Presentations:**

Presentations for the FS-1 plume are listed in [Table 5](#).

**Project Note Submittals:**

The project notes submitted for the FS-1 plume under the SPEIM program are included in [Attachment B](#).

**Report Submittals:**

- *Draft Fuel Spill-1 Hydraulic Evaluation Technical Memorandum* (November 2004)
- *Draft Fuel Spill-1 2004 System Performance and Ecological Impact Monitoring Report* (February 2005)
- *Final Fuel Spill-1 Hydraulic Evaluation Technical Memorandum* (June 2005)

- *Final Fuel Spill-1 2004 System Performance and Ecological Impact Monitoring Report* (June 2005)
- *Draft Fuel Spill-1 2005 Hydrologic Assessment of Two Ecosystems of Concern Technical Memorandum* (November 2005)

### **Optimizations:**

Optimization activities are completed as part of the SPEIM program in order to improve the performance of the remedial systems and to improve the monitoring program. Recommendations for optimizing the FS-1 monitoring program were presented in the *Final Fuel Spill-1 2004 System Performance and Ecological Impact Monitoring Report* (AFCEE 2005)<sup>1</sup>.

### **FS-1 REMEDIAL STATUS UPDATE**

Analytical results from the influent and effluent sampling ports for the FS-1 plant are presented in [Table 6](#). Average weekly flow rates for the FS-1 extraction wells are presented in [Table 7](#). Treatment system operational downtimes or deviations (for events lasting two hours or longer) between September 2004 and December 2005 are summarized in [Table 8](#). Mass removal calculations through December 2005 for the FS-1 treatment plant are presented in [Table 9](#).

The most recent plume shell for the FS-1 plume included data collected through June 2004 (AFCEE 2005)<sup>1</sup>. Based on the most recent plume shell mass estimates (approximately 6.4 pounds) and assuming that plume mass decreased only through treatment system removal (approximately 2.8 pounds) between July 2004 and December 2005; the mass remaining in the FS-1 plume at the end of December 2005 is estimated to be approximately 3.6 pounds of EDB. The volume of contaminated groundwater in the FS-1 plume, based on the 2004 plume shell, is estimated to be 1.14 billion gallons.

The FS-1 ETD system is currently operating under the design flow rates presented in the final wellfield design report (AFCEE 2001)<sup>2</sup>. Using the most recent plume shell and assuming the system will operate continuously under the wellfield design scenario, groundwater transport modeling results indicates that EDB at concentrations above the Massachusetts Maximum Contaminant Level will still be present in the FS-1 plume after 2029 (AFCEE 2005)<sup>1</sup>. Through the SPEIM program, remedial system operation is continuously evaluated and optimized to reduce cleanup times, therefore this timeframe will most likely be decreased in future scenarios.

### **FS-1 SPEIM ACTIVITIES PLANNED FOR 2006**

Activities currently planned for the FS-1 SPEIM program for 2006 include the following:

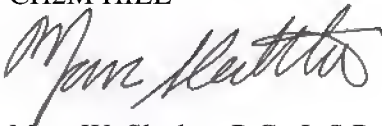
- Annual (May 2006) and semiannual (October 2006) groundwater sampling
- Quarterly (January, April/May, July, and October 2006) extraction well sampling
- Monthly (January – December 2006), Quarterly (April, June, October, and December 2006), and semiannual (April and October 2006) surface water sampling
- Semiannual (May and October 2006) synoptic water level measurements
- Monthly treatment plant sampling (January through December 2006)

- Recording of daily average treatment system flow rates (January through December 2006)
- FS-1 SPEIM data presentations for data collected between January and May 2006 and for data collected between June and December 2006 and monthly surface water results presentations
- Submittal of an FS-1 Remedial System Optimization Technical Memorandum
- Optimization of the monitoring network

If you have any questions or comments, please contact John Schoolfield at (508) 968-4670, extension 5601.

Sincerely,

CH2M HILL



Marc W. Slechta, P.G., L.S.P.  
Program Manager

Attachments:

<a href="#">Figure 1</a>	FS-1 Groundwater Plume and Treatment System
<a href="#">Figure 2</a>	FS-1 Chemical Monitoring Locations
<a href="#">Figure 3</a>	FS-1 Hydraulic Monitoring Locations
<a href="#">Figure 4</a>	FS-1 2005 Ethylene Dibromide Detections
<a href="#">Table 1</a>	FS-1 Well Construction and Surface Water Sampling Location Information
<a href="#">Table 2</a>	Groundwater Monitoring Results
<a href="#">Table 3</a>	Surface Water Monitoring Results
<a href="#">Table 4</a>	Hydraulic Monitoring Results
<a href="#">Table 5</a>	FS-1 Meeting Presentations
<a href="#">Table 6</a>	FS-1 Treatment Plant Sampling Results
<a href="#">Table 7</a>	FS-1 Treatment System Flow Rates
<a href="#">Table 8</a>	Treatment System Downtime Summary
<a href="#">Table 9</a>	FS-1 Treatment System Mass Removal Summary
<a href="#">Attachment A</a>	Comparison of Detected Concentrations in FS-1 Groundwater and Surface Water to Applicable Groundwater and Surface Water Standards
<a href="#">Attachment B</a>	FS-1 Project Notes

Enclosures: (1 unbound, 7 unbound, 7 CDs)

c: Mike Minor, AFCEE (1)	Denis LeBlanc, USGS (1 CD)
Rose Forbes, AFCEE (1)	David Williams, DPH (1 CD)
John Schoolfield, AFCEE (1)	Steven Solbo, Jr., Mashpee Conserv. (2)
Melvin Alli, AFCEE/ISA/COR (1 CD)	Glen Harrington, Mashpee BH (1 CD)
Teri DuPriest, AFCEE/ACOR (1 CD)	Steve Hurley, MDFW (1 CD)
AFCEE/MSCD (1 CD)	Jeff Lafleur, Cape Cod Cranberry Growers Assoc. (1 CD)
HSW/PKVB (1 w/o attach.)	Phil Brady, MA Div. of Marine Fisheries (1 CD)
Peter Golonka, GF (1 bound, 1 CD)	Bill Fisher, Haley & Aldrich (1)
Leonard Pinaud, MassDEP (1 bound, 1 CD)	Peggy Fontazzi, Land Use Permitting (1)
Paul Marchessault, EPA (1 bound, 1 CD)	Brian Handy, Handy Cranberry Trust (1)
James Quin, EEG (1)	CH2M HILL Doc. Control & Distribution

<sup>1</sup> AFCEE (U.S. Air Force Center for Environmental Excellence). 2005 (June). *Final Fuel Spill-1 2004 System Performance and Ecological Impact Monitoring Report*. 324146-SPEIM-FS-1-ANRPT-001. Prepared by CH2M HILL for AFCEE/MMR, Installation Restoration Program, Otis Air National Guard Base, MA.

<sup>2</sup> AFCEE (U.S. Air Force Center for Environmental Excellence). 2001 (December). *Final Fuel Spill-1 Wellfield Design Report*. AFC-J23-35S19902-M23-0005. Prepared by Jacobs Engineering Group Inc. for AFCEE/MMR, Installation Restoration Program, Otis Air National Guard Base, MA.

<sup>3</sup> AFCEE (U.S. Air Force Center for Environmental Excellence). 2000 (April). *Final Record of Decision Area of Contamination FS-1*. Submitted by Hazardous Waste Remedial Actions Program. Prepared for AFCEE/MMR, Installation Restoration Program, Otis Air National Guard Base, MA.